

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of  
**di Girolamo** et al.

Serial No.: **10/682,586**

Filed: **October 9, 2003**

For: **Stud Spacer for Metal Wall**

Attorney's Docket No: **4782-030**

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) Patent Pending  
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) Examiner: Mr. Phi Dieu N Tran A  
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) Group Art Unit: 3637  
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) Confirmation No.: 9767  
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This appeal brief is being filed in response to the Notice of Non-Compliant Appeal Brief dated December 12, 2007. Although no fees should be required, if any are required, the Commissioner is authorized to charge Deposit Account No. 18-1167.

**APPEAL BRIEF**

**(I.) REAL PARTY IN INTEREST**

The real party in interest is The Steel Network, Inc.

**(II.) RELATED APPEALS AND INTERFERENCES**

There are no related appeals or interferences.

### **(III.) STATUS OF CLAIMS**

Claims 1-38 are pending in this application. Claims 9, 10, 12-20 and 25-33 are withdrawn. Claims 1-8, 11, 21-24, 34-38 are rejected and are appealed herein.

### **(IV.) STATUS OF AMENDMENTS**

All amendments have been entered.

### **(V.) SUMMARY OF CLAIMED SUBJECT MATTER**

Claim 1 is directed to a stud spacer **10** that extends between two studs **24** in a wall where each of the studs include an opening **24C**. See Fig. 1A; page 2, paragraph 2, lines 2-3; page 6, paragraph 3, line 10. The stud spacer includes a main member adapted to extend between two studs. The main member includes first and second end portions. A projection **40** extends from one of the end portions. See Fig. 1A and page 4, paragraph 5, lines 4-6 and page 5, lines 1-3. An opening **42** is formed in the other end portion. See Fig. 1A and page 6, paragraph 1, lines 1-2. The stud spacer **10** is connected to another stud spacer by extending the projection **40** of the stud spacer through the opening **24C** within one stud and into the opening **42** of another stud. See page 6, paragraph 1, lines 3-6.

Claim 21 calls for a stud spacer **10** that extends between two studs **24**. See Fig. 1 and page 6, paragraph 2, lines 9-10. The stud spacer **10** includes a main member adapted to extend between the two studs. The main member includes first and second end portions. A projection **200** extends from one end portion. See Fig. 7A-7H and page 7, paragraph 4, lines 3-5. There is provided a projection receiver formed on the other end portion. See page 7 paragraph 4, line 5; and page 8, lines 3-7. The projection **200** or projection receiver includes one or more locking members such that when a projection of one stud is projected into the

projection receiver of another stud, a locked condition is realized. See Fig. 7H, page 10, lines 6-7.

Claim 34 calls for a stud spacer **10** that extends between two studs **24**, and which are connected to one or more similar stud spacers. See Fig. 1 and page 6, paragraph 2, lines 9-10. The stud spacer includes a main member. The main member includes opposed end portions. A projection **100** extends from one end portion. Page 10, paragraph 1, line 6. A receiver **102** is disposed on one end portion of the stud spacer and adapted to receive a projection **100** of another stud spacer. See page 10, paragraph 1, lines 7-9. When the two stud spacers are connected together, the projection **100** of one stud spacer will engage and lock with the receiver **102** of another stud spacer. See page 10, paragraph 1, lines 7-9..

#### **(VI.) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

Claim 1 is rejected under 35 U.S.C. §112, 2<sup>nd</sup> paragraph.

Claims 1-3, 11, 21-24 and 34-38 are rejected under 35 U.S.C. §102(b) as being anticipated by Vukmanic, U.S. Patent No. 4,677,802.

Claims 1-8 are rejected under 35 U.S.C. §102(b) as being anticipated by Kovar et al., U.S. Patent No. 4,246,736.

**(VII.) ARGUMENT**

**A. Claims 1-3, 11, 21-24 and 34-38 Are Not Anticipated By Vukmanic**

Claim 1 is as follows:

A stud spacer for extending between two studs with each stud having an opening therein, the stud spacer comprising:  
a main member adapted to extend between the two studs;  
the main member including first and second end portions;  
a projection extending from one of the end portions;  
an opening formed in the other end portion; and  
wherein one stud spacer is connected to another stud spacer by extending the projection of the one stud spacer through the opening within one stud and into the opening of another stud spacer.

Claim 21 is as follows:

A stud spacer for extending between two studs comprising:  
a main member adapted to extend between the two studs;  
the main member including first and second end portions;  
a projection extending from one end portion;  
a projection receiver formed on the other end portion; and  
wherein either the projection or projection receiver includes one or more locking members such that when a projection of one stud spacer is projected into the projection receiver of another stud spacer a locked condition is realized.

**1. The Examiner refuses to construe the claims**

Nowhere in the record is there any evidence that the Examiner construed the claim term “stud spacer.” Throughout the prosecution history it is apparent that Applicants and the Examiner strongly disagree on the proper construction of the claim term “stud spacer.” If the Examiner did construe the term “stud spacer,” neither the Applicants nor the Board has the benefit of knowing the construction, much less the claim construction analysis.

In Applicants' response of October 20, 2006, The Examiner was specifically requested to set forth a construction for "stud spacer." Response of Oct. 20, 2006, p. 11. The request was ignored. Thus, there are two possibilities. First, the Examiner has refused to construe the "stud spacer" term, or secondly, the Examiner has construed the term, but refuses to disclose the construction. Either way, the Section 102 analysis is error as a matter of law. Claim construction is essential in a Section 102 analysis. See Section 2111.01 MPEP.

**2. Properly construed, the claims are not anticipated by Vukmanic**

As noted above, the first step in a Section 102 analysis is claim construction. All claim terms that are in dispute must be construed.

Section 2111.01 of the MPEP sets forth the basic rules of claim construction in *ex parte* prosecution. The words of the claim must be given their plain and customary meaning unless the plain meaning is inconsistent with the specification. See *In re Zeltz*, 893 F.2d, 319, 321, 13 U.S.P.Q.2d 1320, 1322 (Fed. Cir. 1989). The ordinary and customary meaning of a term may be evidenced by a variety of sources including the specification, the prosecution history, the words of the claims themselves, and extrinsic evidence concerning the meaning of technical terms and the state of the art. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1314, 75 U.S.P.Q.2d 1321, 1327 (Fed. Cir. 2005) (*en banc*).

Based on the specification including the drawings and the customary and ordinary meaning of the term "stud spacer," the term "stud spacer" as used in the present application means a structural member interposed between studs in a wall for holding the studs a given distance from each other. Again, that construction is consistent with the customary and ordinary meaning of the term "stud spacer," consistent with Applicants' specification, and consistent with how a person of ordinary skill in the art would construe the term.

Regarding the ordinary meaning of the term “stud”, the McGraw-Hill Dictionary of Scientific and Technical Terms defines “stud” as follows:

One of the vertical members in the walls of a frame building to which wallboards, lathing, or paneling is nailed or fastened.

See Exhibit 1. (Evidence entered into record at page 9 of Applicant’s response of July 14, 2006).

Certainly, this definition of “stud” is consistent with how Applicants have used the term in their specification. A person of ordinary skill in the art would likewise view the term “stud” as referring to a vertical member in a wall structure.

The same McGraw-Hill Dictionary of Scientific and Technical Terms defines “spacer” as:

A device for holding two members at a given distance from each other.

See Exhibit 2. (Evidence entered into record at page 9 of Applicant’s response of July 14, 2006).

Thus, the term “stud spacer” means a structural member interposed between studs of a wall for holding the studs at a given distance from each other. This construction is consistent with Applicants’ specification and how a person of ordinary skill in the art would construe the term.

Vukmanic does not disclose a stud or a stud spacer. Indeed, Vukmanic does not even show or discuss a wall structure. Instead, Vukmanic discloses a ceiling suspension system that includes main runners 11 and cross runners 12 for supporting ceiling tiles. The Examiner finds that the runners 11 are studs, and that cross runners 12 in the ceiling system constitutes stud spacers. This finding is error. It is contrary to the proper construction of “stud” and “stud spacer.” A ceiling structure is not a wall, and structural components of a ceiling structure can never be deemed a stud or a stud spacer.

All of Applicants' claims are restricted to a stud spacer for extending between studs. Claim 1, for example, recites the term "stud spacer" in both the preamble and body of the claim. Hence, Applicants' claims cannot be anticipated by a reference that does not disclose studs or stud spacers.

**3. The Examiner's finding that Vukmanic discloses a stud spacer is unsupported**

The Examiner's Section 102 rejection rests on the finding that Vukmanic discloses a stud spacer. Indeed, the Examiner states: "[t]he reference Vukmanic shows the stud spacer with its specific structures as claimed, and able to function as claimed." Final Office Action, p. 4. In addition, the Examiner found: "Vukmanic shows a stud spacer (12) for extending between two studs with each stud having an opening therein....." Final Office Action, p. 2. These findings are unsupported. The structure 12 shown in Vukmanic is not a stud spacer. To the contrary, it is a cross runner found in a ceiling structure for supporting ceiling tiles.

These findings bring into focus the shortcomings of the Examiner's Section 102 analysis. That is, if the Examiner would have properly construed the term "stud spacer," then it would have been clear that the cross runner 12 in Vukmanic does not meet the stud spacer limitation in the claims.

**4. The claim term "stud spacer" is a structure and not an intended use phrase**

The Examiner appears to maintain that a stud spacer is not a structural member, but simply an expression of an intended use. Respectfully, Applicant disagrees. The term "stud spacer" is a term of art widely used to describe a structural component of a wall. Persons of ordinary skill extensively refer to stud spacers as structural members in a wall, and the

customary and ordinary meaning of “stud spacer”, as discussed above, is consistent with its use as a term of art.

Many U.S. patents illustrate that the term “stud spacer” is a structure and is commonly referred to as a structure - not an intended use. The use of “stud spacer” as an ordinary term for defining a structure in a wall is evidenced in various U.S. patents. For example, see U.S. Patent No. 6,843,035 which refers to a prior art patent which reveals the use of a “stud spacer” used in construction. U.S. Patent No. 5,274,973 is directed to a Stud Spacer and a Mounting System. U.S. Patent No. 4,625,415, again, relates to a stud spacer. U.S. Patent No. 4,595,165 refers to a 2 x 4 stud spacer. U.S. Patent No. 4,155,208 is directed to a building insulation and refers to stapling a structure to a stud spacer.

**B. Claims 1-8 Are Not Anticipated by Kovar**

**1. Kovar does not disclose all the limitations of claim 1**

In order to anticipate claim 1, for example, Kovar must show every element and limitation of the claim. Kovar, contrary to the Examiner’s findings, does not show each and every element and limitation of the claim. In claim 1, for example, the following limitation is provided:

wherein one stud spacer is connected to another stud spacer by  
extending the projection of the one stud spacer through the  
opening within one stud into the opening of another stud spacer

Kovar teaches a bridging member for extending between joists and other structures including studs. Kovar’s bridging member is never interconnected with another bridging member. In all cases disclosed and described, the Kovar bridging member simply extends between two members and is secured at opposite ends to the two members. Indeed, there are no provisions incorporated into the Kovar bridging member for interconnecting one bridging member to another bridging member.



In Applicants' stud spacer, there is a projection extending from one end portion. This projection projects through an opening in a stud and into an opening formed on the other end of another stud spacer. This is how Applicants' stud spacers are interconnected. This interconnecting feature and the structure that makes it possible, is what is claimed in claim 1.

To attempt to meet these limitations, the Examiner finds that Kovar shows projections 19 and 71, and further finds an opening between structural members 15 and 16. Final Office Action, pp. 3-4. Then the Examiner finds that one so-called stud spacer of Kovar may be connected to another stud spacer by extending the projection 19 or 71 of one stud spacer through the opening formed by members 15 and 16 on another so-called stud spacer. That is error. For example, note the so-called projection 71 shown in Figures 7 and 8 of Kovar. This projection 71 does not project through an opening formed between members 15 and 16 to connect one bridging member to another bridging member. The projections 19 and 71 of Kovar connect directly to the joist. They do not extend through an opening in the joists, nor do they extend into an opening about an opposite end of the bridging member. The findings of the Examiner are unsupported. There is no anticipation here. The rejection of claim 1-8 based on Kovar should be reversed.

## **2. All of the limitations in claim 1 are material**

The Examiner appears to be reluctant to consider all of the limitations of claim 1. The Examiner maintains that some of the limitations raise Section 112 issues. In particular, the Examiner finds fault in the Applicants describing the structure of the stud spacer that enables it to be connected to another stud spacer.

There is nothing inherently wrong with placing limitations in a claim that relate to the structure being claimed, and which indicate how that structure will cooperate or be connected with another like structure. After all, that is a part of the Applicants' invention, and the

Applicants must have a way to describe in clear terms how the structure is made and functions. That is precisely what the Applicants have done in this case.

**C. The Examiner's Section 112 Rejection of Claim 1 is Without Merit**

The Examiner maintains that claim 1 is indefinite under Section 112 for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. The Examiner finds that the phrase "is connected" is indefinite as it confuses the scope of the claim. The Examiner maintains that the claim is to a stud spacer only, not a system of stud spacers connected to each other.

Claim 1 is not indefinite. The scope of the claim is clear. It is directed to a stud spacer. The Examiner appears to confuse the issue of describing the stud spacer with that of claiming a system of interconnected stud spacers. Claim 1 only tells how the stud spacer being claimed is connected to another stud spacer. In simple terms, the stud spacer includes a projection on one end, and an opening on the other end. Claim 1 states that the stud spacer is connected to another stud spacer by extending the projection of the stud spacer through an opening in a stud and into the opening of another stud spacer.

The Examiner, in the final office action, has suggested that the language be changed to "is adapted to be connected." Respectfully, it is believed that the Examiner's suggestion and what is contained in the claim are essentially the same, especially in terms of the scope of the claim. If this continues to be an issue in this case, Applicants are certainly willing to amend the claim to utilize the language suggested by the Examiner.

**Conclusion**

For the foregoing reasons, the Board is urged to reverse the Examiner's rejections of claims 1-8, 11, 21-24 and 34-38.

**(VIII.) CLAIMS APPENDIX**

1. A stud spacer for extending between two studs with each stud having an opening therein, the stud spacer comprising:

a main member adapted to extend between the two studs;  
the main member including first and second end portions;  
a projection extending from one of the end portions;  
an opening formed in the other end portion; and  
wherein one stud spacer is connected to another stud spacer by  
extending the projection of the one stud spacer through the opening  
within one stud and into the opening of another stud spacer.

2. The stud spacer of claim 1 including at least one flange for connecting to one of the two studs.

3. The stud spacer of claim 1 including spaced apart flanges for connecting to one of the two studs.

4. The stud spacer of claim 1 wherein the main member includes a pair of side flanges and a pair of end flanges.

5. The stud spacer of claim 4 wherein the end flanges are adapted to be connected to the two studs that the stud spacer extends between.

6. The stud spacer of claim 5 wherein the main member includes a central section and wherein the side flanges are turned out of the plane of the central section.

7. The stud spacer of claim 6 wherein the end flanges and the side flanges are turned in opposite directions with respect to the central section.

8. The stud spacer of claim 4 wherein at least one end flange is divided into at least two portions and wherein the projection extends between the two portions.

11. The stud spacer of claim 1 wherein the opening formed in the second end portion of the main member includes a slot.

21. A stud spacer for extending between two studs comprising:  
a main member adapted to extend between the two studs;  
the main member including first and second end portions;  
a projection extending from one end portion;  
a projection receiver formed on the other end portion; and  
wherein either the projection or projection receiver includes one or more locking members such that when a projection of one stud spacer is projected into the projection receiver of another stud spacer a locked condition is realized.

22. The stud spacer of claim 21 wherein either the projection or projection receiver includes one or more stops for engaging the one or more locking members.

23. The stud spacer of claim 22 wherein the locking members are disposed on the projection and the stops form a part of the projection receiver.

24. The stud spacer of claim 21 wherein at least a portion of the projection is deflectable in response to the projection engaging the projection receiver.

34. A stud spacer for extending between two studs and connected to one or more similar stud spacers, comprising:

- a. a main member;
- b. the main member having opposed end portions;
- c. a projection extending from one end portion;

- d. a receiver disposed on the other end portion and adapted to receive a projection of another stud spacer; and
- e. wherein when two stud spacers are connected together the projection of one stud spacer will engage and lock with the receiver of another stud spacer.

35. The stud spacer of claim 34 wherein the projection and receiver are disposed such that when consecutive stud spacers are connected together, the projections and receivers will overlies each other.

36. The stud spacer of claim 34 wherein both the projection and receiver include a flap that is at least partially flexible.

37. The stud spacer of claim 36 wherein in a locked position, the flaps of the projection and receiver engage each other.

38. The stud spacer of claim 34 wherein both the projection and receiver include a flexible flap, a hold down element, an opening disposed between the flap and the hold down element, a deflector, and an opening disposed between the deflector and the hold down element.

**(IX.) EVIDENCE APPENDIX**

Exhibit 1: Definition of “stud” from McGraw-Hill Dictionary of Scientific and Technical Terms. (Evidence entered into record at page 9 of Applicant’s response of July 14, 2006).

Exhibit 2: Definition of “spacer” from McGraw-Hill Dictionary of Scientific and Technical Terms. (Evidence entered into record at page 9 of Applicant’s response of July 14, 2006).

**(X.) RELATED PROCEEDINGS APPENDIX**

There are no related proceedings.

Respectfully submitted,

COATS & BENNETT, P.L.L.C.

A handwritten signature in black ink, appearing to read "Larry L. Coats", is written over a horizontal line.

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EXHIBIT

1

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On the cover: Photomicrograph of crystals of vitamin B<sub>12</sub>.  
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In addition, material has been drawn from the following references: R. E. Huschke, *Glossary of Meteorology*, American Meteorological Society, 1959; *U.S. Air Force Glossary of Standardized Terms*, AF Manual 11-1, vol. 1, 1972; *Communications-Electronics Terminology*, AF Manual 11-1, vol. 3, 1970; W. H. Allen, ed., *Dictionary of Technical Terms for Aerospace Use*, 1st ed., National Aeronautics and Space Administration, 1965; J. M. Gilliland, *Solar-Terrestrial Physics: A Glossary of Terms and Abbreviations*, Royal Aircraft Establishment Technical Report 67158, 1967; *Glossary of Air Traffic Control Terms*, Federal Aviation Agency; *A Glossary of Range Terminology*, White Sands Missile Range, New Mexico, National Bureau of Standards, AD 467-424; *A DOD Glossary of Mapping, Charting and Geodetic Terms*, 1st ed., Department of Defense, 1967; P. W. Thrush, comp. and ed., *A Dictionary of Mining, Mineral, and Related Terms*, Bureau of Mines, 1968; *Nuclear Terms: A Glossary*, 2d ed., Atomic Energy Commission; F. Casey, ed., *Compilation of Terms in Information Sciences Technology*, Federal Council for Science and Technology, 1970; *Glossary of Stinfo Terminology*, Office of Aerospace Research, U.S. Air Force, 1963; *Naval Dictionary of Electronic, Technical, and Imperative Terms*, Bureau of Naval Personnel, 1962; *ADP Glossary*, Department of the Navy, NAVSO P-3097.

### **McGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS, Fifth Edition**

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5 6 7 8 9 0    DOW/DOW    9 9

ISBN 0-07-042333-4

#### **Library of Congress Cataloging-in-Publication Data**

McGraw-Hill dictionary of scientific and technical terms /  
Sybil P. Parker, editor in chief.—5th ed.

p.      cm.

ISBN 0-07-042333-4

1. Science—Dictionaries.    2. Technology—Dictionaries.

I. Parker, Sybil P.

Q123.M34    1993

503—dc20

93-34772

CIP

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# stub matching

**stub matching** [ELECTROMAG] Use of a stub to match a transmission line to an antenna or load; matching depends on the spacing between the two wires of the stub, the position of the shorting bar, and the point at which the transmission line is connected to the stub. { 'stəb ,mætʃ-ɪŋ }

**stub mortise** [ENG] A mortise which passes through only part of a timber. { 'stəb ,mɔ:rd-əs }

**Stubs gage** [DES ENG] A number system for denoting the thickness of steel wire and drills. { 'stəbz ,gæj }

**stub-supported coaxial** [ELECTROMAG] Coaxial whose inner conductor is supported by means of short-circuited coaxial stubs. { 'stəb sə,pɔ:rd-əd kə'ak-sē-əl }

**stub-supported line** [ELECTROMAG] A transmission line that is supported by short-circuited quarter-wave sections of coaxial line; a stub exactly a quarter-wavelength long acts as an insulator because it has infinite reactance. { 'stəb sə,pɔ:rd-əd 'lɪn }

**stub switch** [ENG] A pair of short switch rails, held only at one or near one end and free to move at the other end; used in mining and to some extent on narrow-gage industrial tramways. { 'stəb ,swɪtʃ }

**stub tenon** [ENG] A tenon that fits into a stub mortise. { 'stəb ,ten-ən }

**stub tube** [MECH ENG] A short tube welded to a boiler or pressure vessel to provide for the attachment of additional parts. { 'stəb ,tüb }

**stub tuner** [ELECTROMAG] Stub which is terminated by movable short-circuiting means and used for matching impedance in the line to which it is joined as a branch. { 'stəb ,tʏn-ər }

**stucco** [MATER] A smooth plasterlike material applied to the outside wall or other exterior surface of a building or structure. { 'stək-ə }

**stud** [BUILD] One of the vertical members in the walls of a framed building to which wallboards, lathing, or paneling is nailed or fastened. [DES ENG] 1. A rivet, boss, or nail with a large, ornamental head. 2. A short rod or bolt threaded at both ends without a head. { 'stəd }

**stud driver** [MECH ENG] A device, such as an impact wrench, for driving a hardened steel nail (stud) into concrete or other hard materials. { 'stəd ,draɪ-vər }

**Student's distribution** [STAT] The probability distribution used to test the hypothesis that a random sample of  $n$  observations comes from a normal population with a given mean. { 'stju:d-əns ,dɪs-trɪ'bʏʃ-ən }

**Student's t-statistic** [STAT] A one-sample test statistic computed by  $T = \sqrt{n}(\bar{X} - \mu_H)/S$ , where  $\bar{X}$  is the mean of a collection of  $n$  observations,  $S$  is the square root of the mean square deviation, and  $\mu_H$  is the hypothesized mean. { 'stju:d-əns 'tɛ stə,tɪs-tɪk }

**Student's t-test** [STAT] A test in a one-sample problem which uses Student's t-statistic. { 'stju:d-əns 'tɛ ,test }

**studio** [COMMUN] A room in which television or radio programs are produced. { 'stju:d-ɪ-ə }

**stud link chain** [NAV ARCH] Chain in which each link has a stud at its midlength perpendicular to the major axis to maintain the shape of the link. { 'stəb ,lɪŋk ,çæn }

**stud wall** [BUILD] A wall formed with timbers; studs are usually spaced 12-16 inches (30-41 centimeters) on center. { 'stəb ,wɔ:l }

**stud welding** [MET] Arc-welding using the heat of an electric arc produced between a metal stud and another part, and then bringing the parts together under pressure. { 'stəd ,weld-ɪŋ }

**stuffed mineral** [MINERAL] A mineral having extra ions of a foreign element within its larger interstices. { 'stəft 'mɪn-ərəl }

**stuffing** [ENG] A method of sealing the mechanical joint between two metal surfaces; packing (stuffing) material is inserted within the seal area container (the stuffing or packing box), and compressed to a liquid-proof seal by a threaded packing ring follower. Also known as packing. { 'stʌf-ɪŋ }

**stuffing box** [ENG] A packed, pressure-tight joint for a rod that moves through a hole, to reduce or eliminate fluid leakage. { 'stʌf-ɪŋ ,bɔ:ks }

**stuffing nut** [ENG] A nut for adjusting a stuffing box. { 'stʌf-ɪŋ ,nʌt }

**stull** [MIN ENG] A platform laid on timbers, braced across a working from side to side, to support workers or to carry ore or waste. { 'stəl }

**Stull piece** [MIN ENG] 1. A piece of timber placed slanting over the back of a level to prevent rock falling into the level

from the stopes above. 2. Timbers bracing the platform of a stull. { 'stəl ,pēs }

**stullstopping** [MIN ENG] Stull timbers placed between the foot and hanging walls, which constitute the only artificial support provided during the excavation of a stope. { 'stəl ,stɒp-ɪŋ }

**stump** [MIN ENG] A small pillar of coal left between the gangway or airway and the breasts to protect these passages; any small pillar. { 'stʌmp }

**stunt** [PL PATH] Any of several plant diseases marked by reduction in size of the plant. { 'stʌnt }

**stunt box** [ELEC] A device to control the nonprinting functions of a teletypewriter terminal. { 'stʌnt ,bɔ:ks }

**stupp** [MIN ENG] A black residue from distilled mercury ore, consisting of soot, hydrocarbons, mercury and mercury compounds, and ore dust. { 'stʌp }

**sturgeon** [VERT ZOO] Any of 10 species of large bottom-living fish which comprise the family Acipenseridae; the body has five rows of bony plates, and the snout is elongate with four barbels on its lower surface. { 'stɜ:rdʒən }

**Sturges rule** [STAT] A rule for determining the desirable number of groups into which a distribution of observations should be classified; the number of groups or classes is  $1 + 3.3 \log n$ , where  $n$  is the number of observations. { 'stɜ:rdʒəs ,rʌl }

**Sturm-Liouville problem** [MATH] The general problem of solving a given linear differential equation of order  $2n$  together with  $2n$ -boundary conditions. Also known as eigenvalue problem. { 'stɜ:m lyu:'vil ,prɒb-ləm }

**Sturm-Liouville system** [MATH] A given differential equation together with its boundary conditions having Sturm-Liouville problem form. { 'stɜ:m lyu:'vil ,sɪs-təm }

**Sturm sequence** [MATH] For a polynomial  $p(x)$ , this is the sequence of functions  $f_0(x), f_1(x), \dots$ , where  $f_0(x) = p(x), f_1(x) = p'(x)$ , and  $f_n(x)$  is the negative remainder that occurs by finding the greatest common divisor of  $f_{n-2}(x)$  and  $f_{n-1}(x)$  via the Euclidean algorithm. { 'stɜ:m ,sek-wəns }

**Sturm's theorem** [MATH] This gives a method to determine the number of real roots of a polynomial  $p(x)$  which lie between two given values of  $x$ ; the Sturm sequence of  $p(x)$  provides the necessary information. { 'stɜ:mz ,θɪr-əm }

**sturtite** [MINERAL] A black mineral composed of hydrous silicate of iron, manganese, calcium, and magnesium; occurs in compact masses. { 'stɜ:rdɪt }

**stutter** [COMMUN] Series of undesired black and white lines sometimes produced when a facsimile signal undergoes a sharp amplitude change. [MED] A speech disorder marked by repetition of words, syllables, or sounds, or by hesitations in manner by the speaker. { 'stʌd-ər }

**Stuve chart** [METEOROL] A thermodynamic diagram with atmospheric temperature as the  $x$  axis and atmospheric pressure to the power 0.286 as the  $y$  ordinate, increasing downward; named after G. Stuve. Also known as adiabatic chart; pseudoadiabatic chart. { 'stju:v-ə ,çɑ:t }

**S twist** [TEXT] A left-handed yarn twist in which the spirals resemble the letter S. { 'es ,twɪst }

**sty** See hordeolum. { 'sti }

**Styginae** [INV ZOO] A subfamily of butterflies in the family Lycaenidae in which the prothoracic legs in the male are non-functional. { 'stɪj-ə-nē }

**Stygocaridacea** [INV ZOO] An order of crustaceans in the superorder Syncarida characterized by having a furca. { ,stɪg-ə ,kær-ə'dæs-ē-ə }

**Stylasterina** [INV ZOO] An order of the class Hydrozoa, including several brightly colored branching or encrusting coral-like cnidarians of warm seas. { 'stə ,læs-tər-ɪ-nə }

**style** [BOT] The portion of a pistil connecting the stigma and ovary. [ENG] See gnomon. [ZOO] A slender elongated process on an animal. { 'stɪl }

**stylet** [GRAPHICS] A slender, pointed marking tool, as one used in graving. [INV ZOO] A slender, rigid, elongated appendage. [MED] 1. A slender probe used for surgery. 2. A thin wire inserted in a catheter to provide support or in a hollow needle to clear the passage. { 'stɪ-lət }

**styloglossus** [ANAT] A muscle arising from the styloid process of the temporal bone, and inserted into the tongue. { 'stɪ ,lə'glɔ:s-əs }

**stylohyoid** [ANAT] Pertaining to the styloid process of the temporal bone and the hyoid bone. { 'stɪ-lə'hi-ɔɪd }

**styloid** [ZOO] Resembling a style. { 'stɪ-lɔɪd }

STURGEON



Short-nosed sturgeon (*Acipenser brevirostrus*).

# MCDRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS

Fifth Edition

EXHIBIT

2

# **McGraw-Hill Dictionary of Scientific and Technical Terms**

## **Fifth Edition**

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Auckland    Bogotá    New York    San Francisco    Washington, D.C.  
Montreal    New Delhi    Caracas    Lisbon    London    Madrid    Mexico City  
                         San Juan    Singapore    Sydney    Tokyo

On the cover: Photomicrograph of crystals of vitamin B<sub>1</sub>.  
(Dennis Kunkel, University of Hawaii)

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5 6 7 8 9 0    DOW/DOW    9 9

ISBN 0-07-042333-4

#### **Library of Congress Cataloging-in-Publication Data**

McGraw-Hill dictionary of scientific and technical terms /  
Sybil P. Parker, editor in chief.—5th ed.

p.      cm.

ISBN 0-07-042333-4

1. Science—Dictionaries.    2. Technology—Dictionaries.

I. Parker, Sybil P.

Q123.M34    1993

503—dc20

93-34772

CIP

#### **INTERNATIONAL EDITION**

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When ordering this title, use ISBN 0-07-113584-7.

## space polar coordinates

the permeability of a vacuum is arbitrarily taken as unity; in the meter-kilogram-second-ampere system, it is  $4\pi \times 10^{-7}$  { 'spās ,pərmē-ə'bil-əd-ē }

**space polar coordinates** [MATH] A system of coordinates by which a point is located in space by its distance from a fixed point called the pole, the colatitude or angle between the polar axis (a reference line through the pole) and the radius vector (a straight line connecting the pole and the point), and the longitude or angle between a reference plane containing the polar axis and a plane through the radius vector and polar axis. { 'spās 'pō-lər kō'ōrd-ən-əts }

**spaceport** [AERO ENG] An installation used to test and launch spacecraft. { 'spās ,pōrt }

**space power system** [AERO ENG] An on-board assemblage of equipment to generate and distribute electrical energy on satellites and spacecraft. { 'spās 'paū-ər ,sist-əm }

**space probe** [AERO ENG] An instrumented vehicle, the payload of a rocket-launching system designed specifically for flight missions to other planets or the moon and into deep space, as distinguished from earth-orbiting satellites. { 'spās ,prōb }

**space processing** [ENG] The carrying out of various processes aboard orbiting spacecraft, utilizing the low-gravity, high-vacuum environment associated with these vehicles. { 'spās ,prə'ses-ŋ }

**space quadrature** [PHYS] A difference of a quarter-wavelength in the position of corresponding points of a wave in space. { 'spās ,kwād-rə-čər }

**space quantization** [QUANT MECH] The quantization of the component of the angular momentum of a system in some specified direction. { 'spās ,kwānt-ə'zā-shən }

**spacer** [ENG] 1. A piece of metal wire twisted at one end to form a guard to keep the explosive in a shothole in place and twisted at the other end to form a guard to hold the tamping in its place. 2. A piece of wood doweling interposed between charges to extend the column of explosive. 3. A device for holding two members at a given distance from each other. Also known as spacer block. 4. The tapered section of a pug joining the barrel to the die; clay is compressed in this section before it issues through the die. { 'spās-ər }

**spacer block** See spacer. { 'spās-ər ,blāk }

**spacer deoxyribonucleic acid** [MOL BIO] Untranscribed deoxyribonucleic acid (DNA) segments, usually containing repetitive DNA, of eukaryotic and some viral genomes flanking functional genetic regions (cistrons). { 'spās-ər dē,'āk-sē,rī'bō-nū,klē-ik 'as-əd }

**space reconnaissance** [AERO ENG] Reconnaissance of the surface of a planet from a space ship or satellite. { 'spās ri,kān-ə'seɪn }

**space reddening** [ASTRON] Reddening of light from distant stars caused by selective absorption of blue light by interstellar dust clouds. { 'spās ,red-ən-ŋ }

**space reflection symmetry** See parity. { 'spās ri,'flek-shən ,sɪm-ə'trē }

**space request** [COMPUT SCI] A parameter that specifies the amount of storage space required by a new file at the time the file is created. { 'spās ri,kwest }

**space research** [AERO ENG] Research involving studies of all aspects of environmental conditions beyond the atmosphere of the earth. { 'spās ri,sərçh }

**spacer strip** [MET] A strip or bar of metal placed in the root of a weld joint, prepared for a groove weld, to serve as backing and maintain root opening during welding. { 'spās-ər ,stri:p }

**space satellite** [AERO ENG] A vehicle, crewed or uncrewed, (or orbiting the earth. { 'spās ,səd-əl,ɪt }

**space ship** See spacecraft. { 'spās ,ʃɪp }

**space shuttle** [AERO ENG] A reusable orbital spacecraft, designed to travel from the earth to an orbital trajectory and then to return. { 'spās ,ʃləd-əl }

**space simulator** [AERO ENG] 1. Any device which simulates one or more parameters of the space environment and which is used to test space systems or components. 2. Specifically, a closed chamber capable of reproducing approximately the vacuum and normal environments of space. { 'spās ,sɪm-yə,lād-ɪŋ }

**space station** [AERO ENG] An autonomous, permanent facility in space for the conduct of scientific and technological research, earth-oriented applications, and astronomical observations. { 'spās ,stā-shən }

**space suit** [ENG] A pressure suit for wear in space or at very

low ambient pressures within the atmosphere, designed to permit the wearer to leave the protection of a pressurized cabin. { 'spās ,sūt }

**space suppression** [COMPUT SCI] Prevention of the normal movement of paper in a computer printer after the printing of a line of characters. { 'spās sə,presh-ən }

**space technology** [AERO ENG] The systematic application of engineering and scientific disciplines to the exploration and utilization of outer space. { 'spās tek,nāl-ə-jē }

**space-time** [RELAT] A four-dimensional space used to represent the universe in the theory of relativity, with three dimensions corresponding to ordinary space and the fourth to time. Also known as space-time continuum. { 'spās 'tɪm }

**space-time continuum** See space-time. { 'spās 'tɪm kən'tɪn-yə-wəm }

**space-to-mark transition** [COMMUN] The transition from the space condition to the mark condition in telegraphic communication. { 'spās tə,'mārk tran'zɪʃ-ən }

**Space Tracking and Data Acquisition Network** [ENG] A network of ground stations operated by the National Aeronautics and Space Administration, which tracks, commands, and receives telemetry for United States and foreign unmanned satellites. Abbreviated STADAN. { 'spās 'trak-ŋ ən 'dād-ə ,æk-wə'zɪʃ-ən ,net,wɜ:k }

**space vehicle** See spacecraft. { 'spās ,vē-ə-kəl }

**space velocity** [ASTRON] A star's true velocity with reference to the sun. [CHEM ENG] The relationship between feed rate and reactor volume in a flow process; defined as the volume or weight of feed (measured at standard conditions) per unit time per unit volume of reactor (or per unit weight of catalyst).

{ 'spās və,lās-əd-ē }

**space walk** [AERO ENG] The movement of an astronaut outside the protected environment of a spacecraft during a space flight; the astronaut wears a spacesuit. { 'spās ,wɒk }

**space wave** [ELECTROMAG] The component of a ground wave that travels more or less directly through space from the transmitting antenna to the receiving antenna; one part of the space wave goes directly from one antenna to the other; another part is reflected off the earth between the antennas. { 'spās ,wæv }

**space weapon** [ORD] A weapon that travels through space and is directed against an enemy target whether on the ground, in the air, or in space. { 'spās ,wep-ən }

**spacing** [GRAPHICS] The arrangement of characters, words, lines, and other elements to give the most pleasing effect on a printed page. { 'spās-ŋ }

**spacing bias** See bias telegraph distortion. { 'spās-ŋ ,bɪ-əs }

**spacing clamp** [PETRO ENG] A clamp for maintaining the rod string in the correct pumping position while the well is in the final stages of being fitted to the pump. { 'spās-ŋ ,klamp }

**spacing pulse** [COMMUN] In teletypewriter operation, the signal interval during which the selector unit is not operated. { 'spās-ŋ ,pʊls }

**spacing wave** See back wave. { 'spās-ŋ ,wæv }

**spacistor** [ELECTR] A multiple-terminal solid-state device, similar to a transistor, that generates frequencies up to about 10,000 megahertz by injecting electrons or holes into a space-charge layer which rapidly forces these carriers to a collecting electrode. { spā'sis-tər }

**spackling** [ENG] The process of repairing a part of a plaster wall or mural by cleaning out the defective spot and then patching it with a plastering material. { 'spak-lɪŋ }

**SPADATS** See space detection and tracking system. { 'spā,dats }

**spade** [DES ENG] A shovel-like implement with a flat oblong blade; used for turning soil by pushing against the blade with the foot. { spād }

**spade bolt** [DES ENG] A bolt having a spade-shaped flattened head with a transverse hole, used to fasten shielded coils, capacitors, and other components to a chassis. { 'spād ,bɒlt }

**spade drill** [DES ENG] A drill consisting of three main parts: a cutting blade, a blade holder or shank, and a device, such as a screw, which fastens the blade to the holder; used for cutting holes over 1 inch (2.54 centimeters) in diameter. { 'spād ,drɪl }

**spade grip** [ORD] D-shaped handle for pointing a gun, fastened on the rear of the receiver of certain flexible automatic weapons. { 'spād ,grɪp }

**spade lug** [DES ENG] An open-ended flat termination for a wire lead, easily slipped under a terminal nut. { 'spād ,ləg }

**spadix** [BOT] A fleshy spike that is enclosed in a leaflike